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CROP PRODUCTION NEWS

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PRODUCTION

Editor's Comments

By Faye Dokken-Bouchard, PAg, Crops Branch

Travelling across the province doing disease surveys this summer, I observed a wide range of crop health: everything from unseeded acres to excellent crops. Rain, wind, hail and plant disease have caused some damage; however, many crops have persisted through environmental stresses and plant diseases, and other pests have been managed well, maintaining yield potential as much as possible. Now we just have to get the crop in the bin.

Unfortunately, the trend of wet weather that we have seen across the province this summer has continued to dampen spirits into harvest. Recent rains have delayed crop maturity and slowed combining. Once we get some much-needed days of warm, dry fall weather, farmers will finally be able to realize their crop potential this season.

According to the Saskatchewan Agriculture's Crop Report, eight per cent of the 2010 crop had been combined by the end of August, with 22 per cent swathed or ready to straight-combine. This compared to a five-year provincial average (2005 to 2009) for this time of year of 28 per cent combined and an additional 25 per cent swathed or ready to straight-combine. For more information, visit www.agriculture.gov.sk.ca/Crop-Report.

Good luck with harvest!

NOTE: Throughout this document, you will see that some publications are in blue font and underlined, indicating links to website information. If you are reading this on your computer screen, click your cursor on the link to take you directly to the website. ☺

Crop Production News is a bi-weekly publication prepared primarily by provincial specialists with the Crops Branch and Regional Services Branch of the Saskatchewan Ministry of Agriculture. It is a compilation of articles related to entomology, plant pathology, weed science, soils and agronomy issues.

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Crop Protection Laboratory Update

By Philip Northover, AAg, Supervisor, Crop Protection Laboratory

Disease submissions have decreased in the past week. The submissions that we are in the process of examining are presenting us with some challenges, due to the multiple factors involved. Weed submissions continue to come in, perhaps a result of the unusual weather, which has enabled less-common species to compete against the weeds more suited to drier conditions.

The number of horticulture samples submitted to the lab has also increased in the past week. The following diseases/disorders have been diagnosed in samples over the past two weeks:

- Wheat: root rots caused by *Rhizoctonia* and *Fusarium* spp;
- Flax: herbicide damage, pasmo;
- Lentils: herbicide damage, white mould (*Sclerotinia sclerotiorum*);
- Canola: phoma leaf spot, blackleg, fusarium root rot, alternaria leaf and pod spot, environmental disorders;
- Pepper: botrytis blight;
- Pumpkin: *Sclerotinia* sp.;
- Grape: leaf hopper damage;
- Rose: leafcutter bee damage;
- Tomato: wilt caused by *Verticillium* or *Fusarium* spp.;
- Raspberry: grey mould, powdery mildew; and
- Spruce and fir trees: rhizosphera needlecast.



Figure 1: *Epilobium* silique/pod.
Source: Saskatchewan Agriculture.

A number of willow herbs (*Epilobium* spp.) (Fig. 1) have been identified in weed samples during the past two weeks, including tall annual willow herb (*Epilobium brachycarpum*), northern or fringed willow herb (*Epilobium ciliatum*) and purple-leaved willow herb (*Epilobium ciliatum* subsp. *glandulosum*).

Other weed samples have been identified as silver sagebrush (*Artemisia cana*), poplar (*Populus* spp.) and giant hyssop (*Agastache foeniculum*). ☼

Agriculture Knowledge Centre Update

By Brent Flaten, PAg, Integrated Pest Management Specialist

The majority of calls this past week have been on topics related to the wet summer and late development of crops, and preparations for harvest. Grey mould (*Botrytis cinerea*) and white mould (*Sclerotinia sclerotiorum*) have been severe in a lot of heavy lentil stands. Crop rotation effect has been evident, with sclerotinia mould often being more severe when lentil followed canola or canola followed lentil. Heavy pea stands are also deteriorating in some areas due to disease from the bottom up. Fusarium head blight is a growing concern as it shows up in cereal crops. Ergot is also being noticed in standing wheat. Farmers planning to seed winter wheat are cautioned about the danger of seeding winter wheat close to immature wheat and providing a "green bridge" for wheat curl mites that cause wheat streak mosaic.

Producers with late crops are wondering if there is anything they can do to hurry crops to maturity. While maturity cannot truly be accelerated, there are some considerations for pre-harvest glyphosate or desiccation with Reglone. Discussions include crop staging for these applications and what each one does and does not do regarding crop maturity and weed control. Swath staging has been another question as producers are hoping to hurry harvest. Wheat stem sawfly damage is also starting to show up in wheat fields. Grain storage questions on insects and aeration continue, regarding last year's crop still in the bin or this year's crop.

Producers are also starting to think about crop rotations and fertilizer for next year.

Forage question topics include perennial forage termination, control for pasture sage and other invasive weeds, yellow feed (glyphosate-treated annual forages), bales heating and deteriorated forage quality. ☼

Flax Testing this Fall – New Testing Method Proposed

By Venkata Vakulabharanam, PAg, Provincial Specialist, Oilseed Crops

Planting Triffid-free flax seed in 2010 was critical to fulfill the requirements of the export protocol between Canada and the European Union. Producers were advised to test their flax seed before planting. Similarly, flax seed from the 2010 harvest must also be tested for the presence of CDC Triffid.

On August 6, 2010, the Flax Council of Canada announced that as of September 1, 2010, the industry requires that any flax entering the commercial grain handling system be subjected to more rigorous testing for the presence of CDC Triffid.

Producers must submit a two-kilogram representative sample from which the laboratory will draw and test four subsamples, each weighing 60 grams (four x 60 gram test). A sample is considered negative only if all four subsamples test negative. Industry called for this test as it is more conclusive than the previous test (one sample of 60 grams, known as a one x 60 gram test).

The flax industry recommends that one representative sample be submitted per 75 to 125 tonnes (3,000 to 5,000 bushels) of a producer's total flax inventory. This means that, if producers have more than 5,000 bushels of flax, they should submit another sample for each additional 5,000 bushels.

Several laboratories including Quantum Biosciences Inc. and Genserve Laboratories in Saskatoon are currently testing to detect the presence of CDC Triffid in flax seed. The cost of the new test will be \$195 + GST (compared to \$105 for a one x 60 gram test). Check with your buyers to find out which testing laboratory they prefer. Not all buyers accept results from all laboratories approved for testing flax.

For the latest information on testing flax and approved laboratories, visit the SaskFlax website at www.saskflax.com and the Flax Council of Canada website at www.flaxcouncil.ca.

Remember, representative sampling is most important for an accurate test. Follow a sound sampling procedure as outlined at www.grainscanada.gc.ca/guides-guides/rs-er/trs-per-eng.htm. Also, laboratories are reminding producers to fill out the application in legible handwriting so that the results are sent to the correct address quickly. ⚙

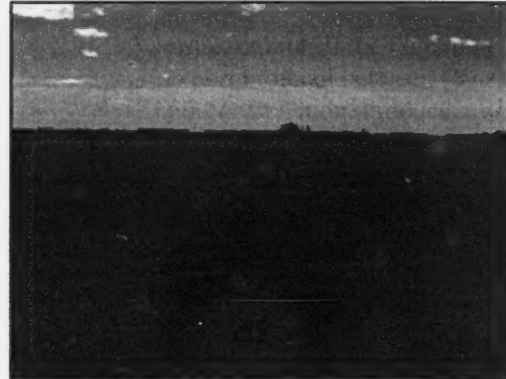


Figure 2: Flowering Flax Field.
Source: Saskatchewan Agriculture

Ug99 Stem Rust Update

By Blaine Recksiedler, PAg, Provincial Specialist, Cereal Crops

Stem rust (*Puccinia graminis* f. sp. *tritici*), is virulent on both wheat and barley, and is considered the most potentially serious disease for these crops. A form of stem rust named Ug99 was first found in Uganda in 1999, and spread to Kenya and Ethiopia, then to Yemen on the Arabian Peninsula, and finally into major wheat growing areas in Iran.

The original race of the pathogen is already changing, with variants found in Sudan, Yemen and Kenya. Some of these areas are considered 'hot spots' for stem rust because of the abundance of barberry bushes, which serve as the alternate host, resulting in sexual reproduction, and allowing new races.



Figure 3: Stem Rust
Source: Dr. Curt McCartney

In the 1980s, a yellow (stripe) rust race spread from East Africa across the Red Sea to Yemen. It then moved into the Near East and Central Asia, causing serious losses along its path in Egypt, Syria, Turkey, Iran, Iraq, Afghanistan and Pakistan. It took only four years to reach South Asia. Experts are predicting a similar pathway for Ug99, as it already has moved from East Africa to Iran. The predicted pathways for spores to reach North and South America are wind across the Pacific Ocean from China, hurricane winds from Morocco, or human transport.

According to the Food and Agriculture Organization of the United Nations, countries in the immediate predicted pathway grow approximately 25 per cent of the global wheat crop. It is quite likely that this strain or its variants will eventually be found throughout the world. Up to 80 per cent of all wheat varieties grown in Asia and Africa, and up to 90 per cent of all wheat varieties worldwide, are susceptible to Ug99. Currently, two Canadian red spring wheat cultivars, Peace and Cadillac, are resistant to Ug99.

An international consortium, Borlaug Global Rust Initiative (BGRI), has been formed to combat Ug99, with funding from various agencies around the world, including the Canadian International Development Agency. The Bill & Melinda Gates Foundation recently announced a \$26.8 million grant to Cornell University to launch the Durable Rust Resistance in Wheat project. Fourteen institutions from around the world will combine forces to combat Ug99 and its variants. Dr. Tom Fetch, stem rust pathologist with Agriculture and Agri-Food Canada (AAFC), is a collaborator on the project. This funding will supplement AAFC's ongoing commitment to find solutions to Ug99.

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Ug99 Stem Rust Update (Continued from page 5)

In July 2009, the Government of Canada announced an investment of \$13 million to fight this disease. Saskatchewan Agriculture also funds pathology research on this disease at the University of Saskatchewan.

Plant breeders and pathologists around the world are sending lines to screening programs in affected areas to gauge the level of resistance. In 2010, approximately 2,900 wheat and barley lines from Canada will be screened against Ug99 in a field nursery in Njoro, Kenya. Other research priorities will include identification of new sources of resistance, molecular marker development and doubled-haploid technology to hasten the employment of resistance genes.

For more information on the BGRI, see their website at www.globalrust.org/. ☼

Downy Brome Control in Winter Wheat

By Blaine Recksiedler, PAg, Provincial Specialist, Cereal Crops
Mark Akins, PAg, Ducks Unlimited Canada

Early plant establishment and vigorous growth can help winter wheat out-compete many weeds. Furthermore, the crop's growth habit and competitiveness allows for efficient use of crop inputs, therefore weed control may be less costly than for other cereal crops. However, growers need to keep a few particular weed management options in mind for their winter wheat crops.

The first step in achieving a successful winter wheat crop is a pre-seed glyphosate application. This will also break the "green bridge" which can allow transmission of the wheat streak mosaic virus.

Winter annual weeds are often the most competitive and costly to winter wheat crops. Because these weeds germinate in the fall and resume growth early in the spring, they can be more difficult to control in the spring due to their advanced stage. This makes fall control a practical and cost-effective approach. Spring-germinating annual weeds are less of a concern because of the advanced and competitive stage of the winter wheat.

Downy brome is an especially troublesome weed in winter wheat. It has a winter annual life cycle similar to winter wheat. Given the opportunity to germinate in fall, and grow unchecked in early spring, it can reduce winter wheat yields significantly. It has an ability to resume spring growth sooner than the winter wheat crop, consuming moisture and out-competing the crop. Growers should avoid planting winter wheat on fields with downy brome problems.

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Downy Brome Control in Winter Wheat (Continued from page 6)

However, if downy brome is present in fall stands of winter wheat, there is a newly registered method of control. Simplicity herbicide, applied at the one- to three-leaf stage in the fall when the brome plants are actively growing, provides control in winter wheat. Fall applications are preferable as control levels are reduced if spraying occurs in spring. Follow label recommendations with regard to application timing and directions.

Few crops on the prairies are as competitive as winter wheat, giving this crop an advantage. However, special attention should be given to fall weed control. This will give the crop a great start in the spring and will pay off next fall. For more information on winter wheat production and fall weed control, contact the Saskatchewan Agriculture Knowledge Centre at 1-866-457-2377 or the Winter Cereals website at www.wintercereals.ca/documents/FS_WWWdControl_091210FINAL.pdf ☼

Another Tree Disease to Worry about – Bronze Leaf Disease of Poplar

By Philip Northover, AAg, Supervisor, Crop Protection Laboratory

As the summer of 2010 comes to a close, the temperature is gradually decreasing and the days are getting shorter. Many trees are already beginning to lose their green colour, turning various shades of yellow, brown, red and orange. While usually a sign of an impending autumn, depending when and what colour the change is, changing leaf colour could suggest a problem. One such example is Dutch elm disease, in which 'flagging' of leaves in the summer could indicate the disease is present in elms. Another lesser known disease is bronze leaf disease of poplar.

Bronze leaf disease is caused by a fungus that is spread by rain and wind. This pathogen has varying effects on poplars but it does not infect any other type of tree. In many poplars, the disease appears as a harmless leaf spot, but in two commonly grown cultivars, Swedish Columnar aspen and Tower poplar, the disease can cause the decline and eventual death of the tree over several years. These two tree cultivars are popular with the public, as they are well adapted to the prairies and grow relatively quickly. They are often grown as windbreaks or used to provide privacy in backyards. Unfortunately, in areas where the pathogen has become established, these trees are no longer suitable for use.



Figure 4: Symptoms of Bronze Leaf disease on leaves of Swedish Columnar Aspen.
Source: Saskatchewan Agriculture.

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Another Tree Disease to Worry about – Bronze Leaf Disease of Poplar (Continued from page 7)

This disease was first identified on Tower poplars and Swedish Columnar aspen in Manitoba in 2002, and, since that time, has been found in a number of areas of Alberta. Recently, it was found on a Swedish Columnar aspen in Regina.

Splashing raindrops can spread the pathogen onto leaves in the spring, but symptoms do not appear for about three months, usually around August. The symptoms are not easily recognized as they are often confused with, or dismissed as drought stress, herbicide damage and autumn colouring. However a few key symptoms that provide a strong indication it may be bronze leaf disease include:

- a reddish-brown coloured leaf (poplar leaves should turn grey-brown in the fall);
- major veins and petioles on the leaves remain green or yellow;
- for most of the winter, infected leaves do not fall off, and are often retained into spring; and
- occasionally an orange stain may be observed in the wood, but not in all cases.

In terms of management options there is very little that can be done, apart from considering other trees as replacements. There are no fungicides registered for controlling this disease. Removing infected limbs, and removal of leaves from around the trees and those that are retained on the branches may be helpful, but these practices have not always been successful. ☼

Seed Maturation, Dormancy and Germination in Dicots

By Dale Risula, PAg, Provincial Specialist, Special Crops

Over the past few weeks, there have been reports of lentils sprouting in their pods. This phenomenon is unusual for lentils; however, not unheard of. Lentil varieties are bred primarily for drier climatic zones, and unusually high levels of precipitation lead to problems. It has been noted that lentils do not like wet feet at seeding time...well, they don't like wet harvest weather either.

Lentils and peas are dicotyledons also known as dicots. Dicots are flowering plants with two embryonic leaves and there are almost 200,000 different species. Some widely found dicots include annual crops commonly grown in Saskatchewan such as dry bean, pea, lentil and chickpea. These crops account for over two million hectares (five million acres) of seeded area in Saskatchewan each year.

Most crops grown today are the result of years of plant breeding to improve the cultivar for maximum yield and quality. A main goal of the breeding program is to find cultivars that produce seed with good germination characteristics to provide uniform and timely emergence.

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Seed Maturation, Dormancy, and Germination in Dicots (Continued from page 8)

Unfortunately, one of the results of domestication has been the diminished quality of dormancy of the seed. In some instances, this is not necessarily beneficial.

Dormancy is the ability of the seed to resist germinating when conditions surrounding the seed are optimal for germination. This quality is particularly useful at times when germination would be disastrous, such as when seeds are still attached to the mother plant (known as viviparous germination). If germination occurs, it diminishes the value of the crop and the ability to retain seed to propagate the crop the following year. Luckily there are plant characteristics that help reduce the chances of viviparous germination. These are thought to be associated with hormones found within the seed coat that inhibit germination initially and then gradually prepare the seed to be able to germinate as it reaches full maturity.

Physiological maturity is reached upon desiccation (drying) of the seed to approximately 35 per cent moisture content. This varies in different species; however, it has been accepted as a suitable standard for harvest maturity for crops grown in Saskatchewan. At this moisture content, the endosperm has hardened and is no longer in its liquid state. Some of the literature cites the term "desiccation tolerance" which relates to the seed's ability to safely dry down to a low moisture content in an artificial environment (e.g. natural aeration or heated air drying systems). The influence of the mother plant begins to diminish at the point when physiological maturity is attained and the seed is shed from the plant or harvested.

Germination is the process in which the plant emerges from the seed and begins growth. In dicots, the embryonic root or radicle is the first to emerge. The radicle absorbs sufficient moisture to allow the embryonic shoot to emerge next. The embryonic shoot is comprised of three main parts: the cotyledons (seed leaves), the portion above the cotyledon (epicotyl), and the portion below the cotyledon (hypocotyl). The manner in which the shoot emerges varies among species.

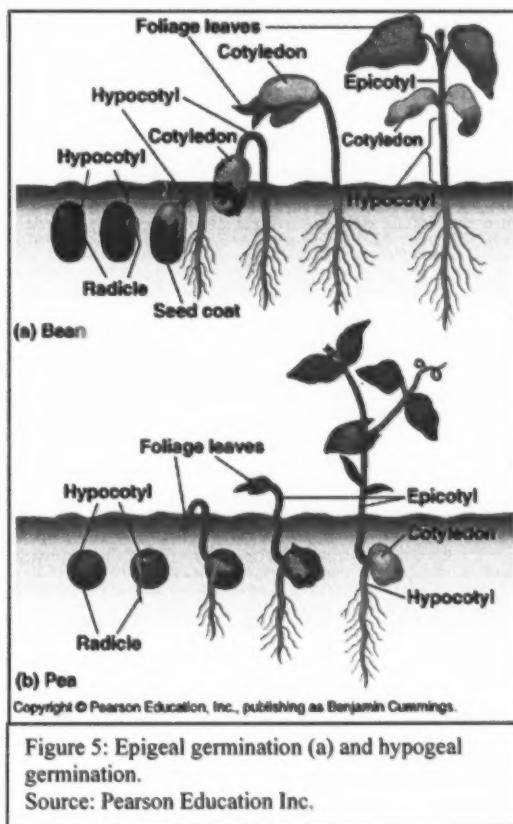


Figure 5: Epigeal germination (a) and hypogeal germination.
Source: Pearson Education Inc.

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Seed Maturation, Dormancy, and Germination in Dicots (Continued from page 9)

Some emerge with the cotyledons remaining below ground (hypogeal), and others with the cotyledons above ground (epigeal). For example, beans have epigeal germination and peas, lentils and chickpeas have hypogeal emergence (Figure 5). This is important since cotyledons are very sensitive to early spring frosts, and bean crops are more likely to suffer damage than pea crops because of this characteristic.

Despite the complexity of seed maturation, crop evaluation for physiological maturity, and for maximum yield and quality, has been transferred to physical indicators such as size, colour and hardness of the seed. With pulse crops that are characterized by indeterminate growth habits, this is a difficult task. Many of the seeds develop at different times throughout the growing season, and determining the best time for harvest can be difficult.

This year, harvest timing is also influenced by the excessively wet weather we have been experiencing. With excess moisture, the seed may lose some of its dormancy inhibition, resulting in viviparous germination (pre-harvest sprouting). These seeds usually lose their ability to develop normal seedlings and are subject to rapid deterioration if stored for any appreciable length of time.

Therefore, harvesting your crop when it is ready becomes very important to maximize yield and quality. Human intervention cannot speed up crop maturation; however, recognizing when the crop reaches harvest maturity is very important, and removing the crop in a timely manner is extremely important in years with adverse weather conditions.

Good luck with your harvest in 2010. ☼



For information about submitting samples to
Saskatchewan Agriculture's Crop Protection Lab,
go to www.agriculture.gov.sk.ca (Programs and
Services > Crop Protection Lab Services); or
www.agriculture.gov.sk.ca/web_videos
Or phone (306) 787-8130.

2010 Dutch Elm Disease Summary

By Brianna Brown, Dutch Elm Disease Technician

Elm samples started to arrive at the Crop Protection Laboratory on June 3, and have continued to arrive steadily since. As of August 25, the Crop Protection Laboratory has received 256 elm samples. Of those samples, 127 have tested positive for Dutch elm disease. Eighty-three samples tested negative, including 23 trees that were positive for Dothiorella wilt. Forty-six samples have yet to be diagnosed. Last year at this time, the lab had received 343 samples, 210 of which were positive.

Fort Qu'appelle and Indian Head continue to have the highest incidence in the province. Fort Qu'appelle had 62 infected trees, a decrease from 102 in 2009. Indian Head had 17 positive trees, which is consistent with last year. Estevan had two trees that tested positive, compared to five last year. Carlyle and Sintaluta each had one infected tree. The Moose Jaw area lost 10 trees, the same number as 2009. The City of Regina lost three trees this year, compared to two last year; however, the area surrounding Regina had 17 positive trees. Saskatoon continues to be free of Dutch elm disease.

It is illegal to transport elm wood, or to store elm fire wood. The elm bark beetle, that can transport the fungus, is attracted to the smell of the freshly cut wood. They are most active from April 1 to August 31. As a result, it is illegal to prune elm trees in this time frame. An elm tree can be removed at any time, as long as proper removal practices are followed. Following these procedures is necessary to prevent the further spread of the disease.

If you would like more information on Dutch elm disease, or suspect an elm is infected, contact the Dutch elm disease hotline at 1-800-SASKELM. ☼

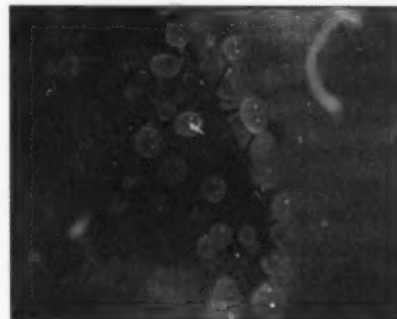


Figure 6: *Ophiostoma ulmi* in culture (the cause of Dutch elm disease).
Source: Saskatchewan Agriculture